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ABSTRACT

Teachers of vocational agriculture are in a unique position to make an outstanding contribution to the welfare of future generations by reason of their knowledge of natural resources. Occupations in natural resources are concerned with improving and maintaining various aspects of the environment. The major purpose of this publication is to assist teachers in providing instruction in agricultural resources assuming that students already possess the knowledge covered in basic agriculture courses. The outline of instruction is divided into 14 sections, with suggested time ranges for each, but it is emphasized that the course should be geared to the local situation. Suggested activities and references are provided for each section of the course. (Author/SA)

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A Guide for Teaching

AGRICULTURAL RESOURCES

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A Guide for Teaching

AGRICULTURAL RESOURCES

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PUBLICATIONS RELATED TO PLANNING AGRICULTURAL EDUCATION PROGRAMS

1000 A Guide for Planning Programs in Agricultural Education

1001 A Guide for Planning Instruction in Agricultural Education

1002 A Guide for Planning Instruction for Adults in Agricultural Education

1003 A Guide for Teaching Basic Agriculture

1004 A Guide for Teaching Agricultural Production

1005 A Guide for Teaching Agricultural Supplies/Services

1006 A Guide for Teaching Agricultural Mechanics

1007 A Guide for Teaching Agricultural Products

1008 A Guide for Teaching Ornamental Horticulture

1009 A Guide for Teaching Agricultural Resources

1010 A Guide for Teaching Forestry

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Foreword

Teachers of vocational agriculture are in a unique position to make an outstanding contribution to the welfare of future generations; being knowledgeable about natural resources, they can and will commit themselves to proper use, conservation, development, restoration, and preservation of these resources. Our young people who will be our leaders of tomorrow must understand the contribution that natural resources make toward our social, cultural, and economic well-being. Therefore, the need for providing education in natural resources as a part of the school curriculum becomes more important each year.

This nation has been built by the use and development of its resources, not by just preserving them or maintaining their status quo. With increasing concern about our environment, including pollution of it, it is essential that natural resource uses be put in the proper perspective so that the energies of our young people can be guided in the right direction. Vocational agriculture offers the greatest opportunity for training many of these young people.

Whether this nation prospers or declines depends on how we use its natural resources. A relatively young nation, we have exploited or destroyed our resources faster than any other nation. The demands on limited natural resources will become continuously greater as population and technology increase. If man is to survive, he must reach and maintain a balance between the demands and the capabilities of his resources. To do this will become increasingly difficult.

Decisions about resource uses are made daily by many, many land users. Wise or unwise, many of these decisions are irreversible. Only through the proper development and implementation of comprehensive resource plans and policies can we reverse the downward trend in the quality and adequacy of the environment in which we live. These must be based upon a careful analysis of each natural resource itself — its nature, capabilities and potentialities; and the human population — its needs, aesthetic desires, abilities and institutions.

During recent years professional agricultural workers sometimes have not enjoyed the prestige and other benefits of many other professions. However, this situation has to be temporary, since the fruits of the professional agricultural workers are so vital to the welfare of society. The need for highly capable people who can provide strong leadership in natural resource uses will become increasingly important. The challenge to vocational agriculture teachers is to help their students see this need and opportunity and to accept the responsibility of making our country a better place to live, work, and play.

Richard T. Benton
State Resource Conservationist
Soil Conservation Service
Jackson, Mississippi

Acknowledgments

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Jackson, Mississippi

Mr. Troy Smith, Teacher of Agriculture, Bogue Chitto,
Mississippi

Appreciation is also expressed to the staff of the Soil Conservation Service in the Jackson, Mississippi, office for supplying numerous suggestions and making available a large number of reference materials. Many of these materials are available to teachers by contacting the Soil Conservation Service, P. O. Box 610, Jackson, Mississippi.

An approach to teaching resource management and utilization which is currently receiving considerable emphasis is the use of outdoor classrooms. These may be established on school lands or on suitable land areas nearby. Information on outdoor classrooms is available from the Soil Conservation Service.

The publication entitled **Course Outline: Agricultural Resources,** prepared by the Agricultural Education Service, State Department of Education, Montgomery, Alabama, was utilized in preparing this guide.

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Providing Instruction in Agricultural Resources

Occupations in agricultural resources are concerned with improving and maintaining various aspects of the environment. These relate to forestry, soil, water, plants, air, fish, wildlife, recreation, and other natural areas. Each of these is of vital concern in the production of food, fiber, and the other needs of man. The productivity of our nation depends on the proper maintenance, conservation, improvement, and utilization of the available natural resources. Increasing demands are being made on resources in order to provide the high standard of living enjoyed by many in the United States.

Purpose

The major purpose of this publication is to assist teachers in providing instruction in agricultural resources. To provide this assistance, the following are included: an outline of suggested instructional content, a list of suggested learning activities for pupils, and a list of suggested references.

Objectives

The overall objectives of instruction in occupations dealing with agricultural resources may vary considerably from one school to another. However, several suggested objectives of the instruction presented in this publication are:

To develop the competencies needed for entering and advancing in employment in agricultural resource occupations.

To develop the human relations traits required for success.

To develop the leadership abilities necessary for success.

To develop the basic knowledge and skill required for entry into a specialized post-secondary educational program in some aspect of agricultural resources.

To develop an appreciation of the importance of natural resources and the need to use, conserve, manage, and improve them.

Classification of Occupations

The system of classification of occupations and code numbers as used by the United States Office of Education applies to this publication. The description of instruction in agricultural resources is:

> A combination of subject matter and planned learning experiences concerned with the principles and processes involved in the conservation and/or improvement of natural resources such as air, forests, soil, water, fish, plants, and wildlife for economic and recreational purposes. Instruction also emphasizes such factors as the establishment, management, and operation of forest lands for recreational purposes.*

The code number is 01.06. Instruction in agricultural resources usually includes subject matter on conserving, utilizing, and servicing resources.

***Vocational Education and Occupations.** Washington: U. S. Office of Education, July, 1969.

Outline of Instruction in Agricultural Resources

An outline of suggested instructional content in agricultural resources is presented here. This outline is based on the assumption that students will already have a knowledge of plants, animals, and related areas, such as that obtained in basic agriculture. In developing local programs, the needs of students should be determined in order to provide the applicable instruction. With this in mind, the purpose of this outline is merely to assist teachers in planning instruction.

I. Determining the occupational opportunities in agricultural resources

A. Importance of agricultural resources

1. Definition of "agricultural resources" and "agricultural resources occupations"
2. Effect of agricultural resources on society

B. Scope of agricultural resources occupations

1. Location (local, state, national, and international)
2. General nature of the work
3. Trend in functions, employment, and location
4. Qualifications for employment

C. Kinds of work in agricultural resources businesses

1. Professional
2. Technical
3. Managerial
4. Clerical
5. Sales
6. Service

D. Examples of occupations

1. Occupations concerned with soil conservation
   a. Soil conservationist
   b. Soil conservationist supervisor
   c. Soil conservation technician
   d. Engineering technician
   e. Soil scientist
   f. Conservation biologist

g. Woodland conservationist
h. Conservation agronomist
i. Range conservationist

2. Occupations concerned with forestry
   a. Forestry aide
   b. Park manager
   c. Forest products manager
   d. Forest products salesman
   e. Grounds keeper
   f. Forest ranger
   g. Forest-fire warden

3. Occupations concerned with wildlife
   a. Wildlife specialist aide
   b. Wildlife refuge manager
   c. Fish hatchery manager or assistant
   d. Wildlife propagator
   e. Predator protector
   f. Game protector
   g. Game warden
   h. Wildlife biologist
   i. Wildlife specialist
   j. Aviary farm worker

4. Occupations concerned with recreation
   a. Camp manager
   b. Stable manager
   c. Animal caretaker
   d. Game protector
   e. Aviary farm worker
   f. Fish warden
   g. Forest ranger
   h. Park attendant

i. Forest-fire warden
j. Hunter-safety warden
k. Guide
l. Campgrounds caretaker
m. Riding instructor
n. Fish hatchery worker

5. Occupations concerned with water and air
   a. Water chemist
   b. Water resource planning division assistant
   c. Waste water technician (federal or state)
   d. Flood control engineer or assistant
   e. Industrial water or air technician or consultant
   f. Civil engineer
   g. Public health departmental employee
   h. Research specialist (college or governmental)
   i. Laboratory chemist or technician
   j. Factory engineer
   k. Animal and plant scientist
   l. Agricultural engineer
   m. Sanitary engineer

E. Trends in employment
   1. Greater opportunities for persons with agricultural education
   2. Continuing education required by technological advances

Student Activities

1. Using the local telephone directory, have students make lists of all businesses and agencies involved with agricultural resources.
2. Arrange for students to visit agricultural resources businesses or agencies and make a study of the kind of work found there.
3. Invite a person working in an agricultural resources occupation to visit class and discuss his work and the functions of the business or agency for which he works. (It is important that this person be qualified to make a presentation and be able to relate to youth.)

Suggested References

Arnold, Walter M., ed. **Career Opportunities: Agricultural, Forestry, and Oceanographic Technicians.** Chicago: J. G. Ferguson Publishing Company, 1969.

Hoover, Norman K. **Handbook of Agricultural Occupations.** Danville, Illinois: The Interstate Printers and Publishers, Inc., 1969.

Roy, Ewell Paul. **Exploring Agribusiness.** Danville, Illinois: The Interstate Printers and Publishers, Inc., 1967.

Stone, Archie A. **Careers in Agribusiness and Industry.** Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

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II. Developing leadership for occupations in agricultural resources

A. Importance of leadership in agricultural resources occupations

B. FFA activities which develop leadership

1. Public speaking, including effective communications
2. Parliamentary procedure
3. Getting to know other persons
4. Learning how to work with other persons (committee work, etc.)
5. Developing work habits (punctuality, dress, etc.)
6. Conducting and participating in meetings

Student Activities

1. Have each student prepare a speech, such as is required in an FFA public speaking contest, on some aspect of agricultural resources. This speech may be given before the class or in an FFA meeting.
2. Have students practice introducing persons to each other through role playing. Follow a procedure as suggested by an etiquette book.
3. Have students prepare for and enter FFA contests which are designed to develop leadership abilities.

Suggested References

Henderson, Melvin, and Rucker, Herbert J. **A Guide to Parliamentary Practices.** Danville, Illinois: The Interstate Printers and Publishers, Inc., (current edition).

Official Manual for Future Farmers of America. Alexandria, Virginia: Future Farmers Supply Service, (current edition).

Stewart, Wilbur F. **Helps in Mastering Parliamentary Procedure.** New Concord, Ohio: G. A. Biery, (current edition).

III. Understanding the occupational experience program in agricultural resources

A. Importance of occupational experience program

1. Explanation of program
2. Benefits of occupational experience program
   a. To student
   b. To business
   c. To community

B. Mechanics of individual occupational experience programs

1. Procurement of occupational experience program training stations
2. Development of outline of training
3. Placement of students
4. Record of activities in occupational experience program
5. Supervision and evaluation of students by teacher
6. Self-evaluation by student

(At this point occupational experience programs will be planned and initiated.)

Student Activities

1. Arrange for students to visit businesses or agencies involved with agricultural resources, especially those in which students will be placed. Note the kind of work performed, number of persons employed, and the general function and organization of each business or agency.
2. Arrange for a former student who studied agricultural resources to visit class and tell of his occupational experience program.

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Extending Instruction in Vocational and Technical Education in Agriculture to Off-Farm Agricultural Occupations. State College, Mississippi: Agricultural Education Department, 1966.

Fuller, Gerald R. **Education for Agricultural Occupations.** Danville, Illinois: The Interstate Printers and Publishers, Inc., 1965.

Mason, Ralph E., and Haines, Peter G. **Cooperative Occupational Education.** Danville, Illinois: The Interstate Printers and Publishers, Inc., 1965.

IV. Understanding the nature of agricultural resources

A. Kinds of resources
   1. Inexhaustible
   2. Exhaustible resources
      a. Nonreplaceable
      b. Replaceable

B. Worth of resources

C. Role of resources in determining level of living

D. Uses of resources
   1. Wind
   2. Water
   3. Oil and gas
   4. Atomic
   5. Solar
   6. Other

E. Nonfuel minerals
   1. Used in manufacturing
   2. Needed by plant and animal life

F. Effect of population growth on resources

G. Aesthetic uses of resources, including recreation

H. Ecology as a part of the study of resources and environment
   1. Ecosystems
   2. Problems
      a. Pollution
      b. Erosion
      c. Waste disposal
      d. Improper land use

Student Activities

1. Have students make a survey to determine the agricultural resources found in the community. List the resources in two groups: inexhaustible and exhaustible. Also, indicate if the exhaustible resources are replaceable.
2. Have students prepare a list of problems which relate to maintaining the agricultural resources as found in the community. Also, discuss possible ways of eliminating these problems. Examples of problems include soil erosion, improper disposal of pesticide containers, and lack of water conservation facilities.

3. Have students study a pond and/or a meadow as an ecosystem.
4. Have students become involved in carrying out projects sponsored by their local soil and water conservation district.

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Mississippi Information Kit on Soil and Water Conservation. Jackson: U. S. Department of Agriculture, Soil Conservation Service, (current edition).

Our Land and Its Care. Washington: National Plant Food Institute, 1962.

Vanderford, H. B. **Managing Southern Soils.** New York: John Wiley and Sons, Inc., 1967.

V. Conserving and utilizing soil

A. Importance of soil

B. Composition of soil

1. Organic matter
2. Plant nutrients
3. Other

C. Classification and identification of soil

D. Soil regions and land resource areas of Mississippi

1. River flood plain (delta)
2. Loess belt (brown loam)
3. Coastal plain

E. Formation of soil

1. Parent material
2. Weathering
3. Climate
4. Native vegetation and organisms
5. Slope and drainage

F. Importance and function of water in the soil

1. Forms of water in the soil

a. Capillary water

b. Hydroscopic water

c. Gravitational water

2. Water table

3. Water requirements of crops, grasses, and forests

4. Loss of water by soil

G. Effect of erosion on soil

1. Kinds of erosion

a. Water

(1) Sheet

(2) Gully

b. Wind

2. Factors affecting soil erosion

a. Physical nature of the soil

b. Climate

c. Slope and horizontal length

d. Vegetative cover

e. Use of land

f. Cultural practices

3. Soil depletion

H. Practices to use in erosion control on cropland

1. Terracing

a. Types of terraces

(1) Bench terrace

(2) Ridge terrace

(3) Diversion terrace

(4) Lister terrace

(5) Parallel terrace

b. Laying out and building terraces

c. Construction of outlets for terrace channels

2. Strip cropping

3. Cropping systems

4. Water outlets

5. Diversion ditches and levees

6. Permanent vegetative covers (grasses or trees)
7. Mulches, fabric covers, etc.
8. Change in land use
9. Minimum tillage

I. Drainage
   1. Definition of agricultural drainage
   2. Feasibility and need of drainage
      a. Relation of soil characteristics to drainage problems
      b. Overflow
      c. Location
      d. Demand for land
      e. Cultural practices
      f. Use of land
   3. Benefits from drainage
      a. Reclaiming land for production of desired crop
      b. Improving productivity
   4. Problems in drainage
      a. Technical
      b. Cost
   5. Methods of drainage
      a. Ditches
      b. Tiles
   6. Considerations in planning and constructing drainage systems
      a. Effect on fish and wildlife
      b. Effect on recreational and ecological conditions

J. Control of gullies
   1. Desilting basins
   2. Mulching
   3. Vegetative covers

K. Control of stream bank erosion
   1. Jetties

2. Riprap
3. Vegetation

L. Use and construction of flumes

M. Engineering surveys

1. Equipment needed
2. Equipment mechanics
3. Techniques of use
   a. Layout of contours
   b. Layout of ditches
      (1) Diversion ditches
      (2) Vee ditches
   c. Layout of terraces
   d. Layout of underground (tile) drainage systems
   e. Layout of levees and dams
   f. Determination of slope of land

Student Activities

1. Arrange for students to survey the community and determine soil problems that exist. Also, possible solutions for solving the problems should be made.
2. Have students observe the effects of erosion on cropland. Determine if the erosion has been caused by water or wind. Discuss possible ways of reclaiming the eroded land.
3. Have students observe the practices that are being used to control erosion in the community, including urban areas. Determine if the practices are effective. Also, note the use made of the land.
4. Have students design a program of erosion control for a nearby farm. A thorough analysis of the land on the farm and specific control measures should be included.
5. Arrange for students to observe the construction of a drainage system. Also, observe land which formerly had drainage problems but is now productive because of the installation of a drainage system.
6. Using differential leveling, have students layout a terrace, vee ditch, and pond dam. All specifications of good construction should be followed.
7. Have students observe the conduction of a soil survey by a soil scientist.
8. Have students prepare for and participate in a land judging contest.
9. Have students participate in the establishment of an outdoor classroom, or nature area.

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Vanderford, H. B. **Managing Southern Soils.** New York: John Wiley and Sons, Inc., 1967.

VI. Conserving and utilizing water

A. Importance of water
   1. In agriculture
   2. In industry
   3. In personal use

B. The hydrology of water
   1. Precipitation
   2. Evaporation
   3. Runoff

C. Sources of water
   1. Ground water
   2. Surface water
      a. Creeks, rivers, etc.
      b. Ponds, lakes, etc.

D. Conservation and storage of water
   1. Cultural practices
   2. Water management districts
   3. River basin districts
   4. Soil and water conservation districts

E. Effect of drainage on water supply
   1. Surface
   2. Subsurface

F. Pollution of water
   1. Sources of water pollution
      a. Industry and factory wastes
      b. Sewage and garbage from municipalities
      c. Individuals
      d. Agriculture
         (1) Sediment
         (2) Plant nutrients
         (3) Inorganic salts and minerals
         (4) Organic wastes
         (5) Chemicals
   2. Damage of water pollution
      a. To health of man and other animals
      b. To recreation
      c. To aesthetic value of resources
      d. To fishing
      e. To agriculture
      f. To water supplies
   3. Control of water pollution
      a. Proper disposal of all wastes
      b. Approved procedures for use of agricultural chemicals
      c. Cultural practices that minimize erosion and leaching
      d. Soil-conserving ground covers

G. Rejuvenation of polluted water
   1. Streams
   2. Lakes

H. Irrigation and water resource management
   1. Purpose of irrigation
   2. Sources of irrigation water
   3. Water rights laws
   4. Types of irrigation systems
      a. Sprinkler
      b. Surface
      c. Subsurface

I. Flood prevention and control

J. Possible uses of salty, brackish, and waste water

K. Weather modification to produce rainfall

L. Zoning regulations and water use and pollution

Student Activities

1. Have students obtain samples of water for testing. (The local health department can assist in getting the water tested.)
2. Arrange for students to visit a nearby farm and observe water usage and disposal. Discuss ways water can be conserved on the farm. Also, note possible sources of pollution, such as improper disposal of pesticide containers.
3. Arrange for students to visit an agricultural products or supplies business or industry and determine the uses made of the water. Also, observe the disposal of waste water. Discuss how the use and disposal of water could be improved. (Examples of businesses to visit include slaughter houses, chemical manufacturing plants, and sawmills.)
4. Arrange for students to tour a city waterworks plant. Determine the source(s) of water, treatment procedures, demand for water, and equipment used to make the water available.
5. Have students visit a nearby farm with an irrigation system. Study the system to determine its effect on increased crop yields, changes in the water table, and operating equipment and procedures.
6. Have students visit a small watershed project and determine how it operates. Also, determine the pollution problems encountered.

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What Is a Watershed? PA-420. Washington: U. S. Department of Agriculture, Soil Conservation Service, 1969.

VII. Conserving and utilizing grasslands and forests

A. Grassland resources

1. Importance of grassland
   a. Acreage in grassland
   b. Types of grassland
      (1) Improved pasture
      (2) Native pasture
2. Principles of grass development
   a. Process of photosynthesis
   b. Food storage cycle in roots
   c. Seasons of growth
   d. Plant succession
3. Management needs of grassland
   a. Intensity of use
   b. Deferred grazing

c. Fertilizer and lime requirements

4. Problems with grasslands
   a. Spot or selective grazing
   b. Overgrazing
   c. Seasonal production and use
   d. Brush and weed control
   e. Disease and insect control
5. Use of grassland as a forage resource

B. Forest resources
1. Importance of forests
   a. Economic value of forestry products
   b. Land in forests
   c. Relationship of forests to other resources
   d. Trends in forestry products utilization
2. Recreational uses of forests
   a. Damage caused in recreation
   b. Making forests more enjoyable
3. Wildlife in forests
4. Enemies of forests
   a. Diseases and insects
   b. Fires

Student Activities

1. Arrange for students to visit a nearby forest area that is used for recreational purposes. Study the features that make the forest enjoyable. Also, observe to see if any damage has resulted from persons using the forest. Discuss improvements that could be made.
2. Have students visit a forest that has been damaged by fire. Specifically observe damage to trees. Also, discuss how the fire could have been prevented and how the forest may be restored.

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Grass: How It Grows. Washington: U. S. Department of Agriculture, Soil Conservation Service, 1968.

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100 Native Forage Grasses in 11 Southern States. Agriculture Handbook No. 389. Washington: U. S. Department of Agriculture, Soil Conservation Service, 1971.

VIII. Maintaining the air

A. Importance of air

B. Composition of air

1. Pure air
2. Polluted air

C. Pollution of air

1. History
2. Effects on health of man and other animals
3. Effects on plants
4. Effects on aesthetics and visibility
5. Kinds of air pollution
   a. Gases
   b. Aerosols
   c. Odors
6. Sources of air pollution
   a. Industrial wastes and by-products
      (1) Smoke from the burning of coal, oil, and other fuels
      (2) Gases produced by manufacturing processes
      (3) Dusts produced by manufacturing processes
      (4) Smoke from the burning of waste products
      (5) Others
   b. Agricultural wastes and by-products
      (1) Dusts from hay and silage
      (2) Dusts from harvesting
      (3) Airborne soil
      (4) Odors from feedlots

(5) Smoke produced by burning of brush, chemical containers, and other materials

(6) Airborne residues of chemicals, such as herbicides or insecticides

(7) Fumes from internal combustion engines

(8) Others

c. Municipal wastes

(1) Smoke from burning of garbage

(2) Odors from sewage lagoons

(3) Others

D. Control of air contamination

1. Industrial control
2. Crankcase vapor and exhaust control (internal combustion engines)
3. Proper use of agricultural chemicals
   a. Rate of application
   b. Proper equipment and adjustment
   c. Weather conditions
4. Use of disposal methods other than burning
5. Feedlot location and sanitation

Student Activities

1. Arrange for students to visit a nearby agricultural industry and observe air pollution control. Determine the kind of pollution produced and the extent of control. Discuss the adequacy of the control measures. Examples of industries to visit include fertilizer manufacturing plants and paper manufacturing plants.
2. Have students visit a nearby farm and observe sources of air pollution. Determine the control measures being used and discuss other possible control measures.

Suggested References

Environmental Quality. The First Annual Report of the Council on Environmental Quality. Washington: U. S. Government Printing Office, August 1970.

Environmental Quality. The Second Annual Report of the Council on Environmental Quality. Washington: U. S. Government Printing Office, August 1971.

Handbook of Air Pollution. Washington: U. S. Government Printing Office, 1968.

Olympus Research Corporation. **Career Education in the Environment.** Washington: U. S. Government Printing Office, (n.d.).

Parson, Ruben L. **Conserving American Resources.** Englewood Cliffs, New Jersey: Prentice-Hall, Inc., (current edition).

IX. Managing wildlife

A. Kind and importance of wildlife
   1. Squirrel
   2. Rabbit
   3. Quail
   4. Dove
   5. Duck
   6. Turkey
   7. Deer
   8. Fur bearing animals
   9. Non-game birds

B. Habitat needs for different wildlife species
   1. Food
   2. Water
   3. Cover
      a. Den trees
      b. Ground brush and cover
      c. Protected water areas
   4. Management of habitats

C. Effects of technology on wildlife
   1. Clearing of forests
   2. Draining of swamps
   3. Damming of rivers
   4. Other agricultural, mining, and industrial activity

D. Types of wildlife refuges, including work to enhance wildlife growth
   1. Special purpose
      a. Big-game
      b. Migratory waterfowl
         (1) Breeding areas
         (2) Resting and feeding areas
         (3) Wintering grounds
   2. General wildlife

E. Identification of important wildlife species, including their habitats
   1. Birds
      a. Upland
      b. Waterfowl
      c. Birds of prey
      d. Nuisance
   2. Animals
      a. Game
      b. Furbearers
      c. Nuisance

F. Practices used for increasing populations of wildlife
   1. Managing natural habitat
   2. Planting cover and food
   3. Providing resting areas
   4. Release of game birds and animals
   5. Establishment of protective regulations
   6. Control of predators

G. Confinement rearing of game birds
   1. Species commonly reared
   2. Housing, facilities, and equipment
   3. Source of young birds
   4. Care of birds
      a. Feeding
      b. Managing
      c. Controlling disease and parasites

H. Confinement rearing of fur animals
   1. Species commonly reared
   2. Housing, facilities, and equipment
   3. Care
      a. Feeding
      b. Breeding
      c. Disease and parasite control

4. Marketing

I. Establishment and operation of wildlife preserves

1. Purpose
2. Laws and regulations
3. Species
4. Release of game
5. Wildlife management requirements
   a. Food and cover
   b. Nesting areas, den trees, and related protective areas
   c. Water
   d. Predator control
6. Costs of establishing and operating game preserves

J. Hunting laws and regulations

Student Activities

1. Arrange for students to visit a game refuge, hunting preserve, and/or water fowl refuge. Observe the operation of the refuge or preserve. Discuss the refuge or preserve with the manager. Determine the species of animals kept, problems in management, and other details.
2. Have students survey the surrounding community for possible locations of game preserves. Develop a hypothetical preserve, including all aspects of management.
3. Invite a game warden to visit class and discuss laws and regulations which apply to wildlife.

Suggested References

Hines, Bob. **Ducks at a Distance.** Washington: U. S. Department of the Interior, Fish and Wildlife Service, 1963.

McNall, P. E., and Kircher, Harry B. **Our Natural Resources.** Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Mississippi Wildlife Conservation Manual. Jackson: Mississippi Game and Fish Commission, (current edition).

New Forests for Wildlife. Washington: U. S. Department of Agriculture, Forest Service, 1970.

Page, Foy. **Deer and Turkey Management.** College Station: Texas A & M University, Teaching Materials Center, (n.d.).

X. Managing fish

A. Kind and importance of fish

1. Catfish

2. Bass
3. Bream
4. Perch
5. Others

B. Fish pond management
1. Selecting pond sites
2. Determining pond size
3. Constructing and establishing the pond
4. Controlling erosion and runoff
5. Stocking rates and dates
6. Feeding
7. Fertilizing ponds
8. Controlling pond weeds
9. Controlling diseases and predators

C. Considerations in fishing, including fee lakes
1. Constructing facilities
2. Establishing fees
3. Advertising
4. Providing for safety features and equipment
5. Providing bait and supplies

D. Laws and regulations

E. Fish hatcheries
1. Establishing facilities
2. Selecting brood stock
3. Spawning
4. Hatching eggs
5. Caring for fry
6. Caring for fingerlings
7. Hauling

Student Activities

1. Arrange for students to visit a nearby fish farm. Determine the kind of fish produced, managerial problems, and facilities needed for fish production.
2. Have students visit a fish farm during harvesting. Observe how the seine is placed and hauled and how the fish are graded, loaded, and hauled.

Suggested References

Invite Birds to Your Home. Washington: U. S. Department of Agriculture, Soil Conservation Service, (n.d.).

Lee, Jasper S. **Catfish Farming.** State College: Mississippi State University, Curriculum Coordinating Unit, 1971.

McNall, P. E., and Kircher, Harry B. **Our Natural Resources.** Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Making Land Produce Useful Wildlife. Farmer's Bulletin No. 2035. Washington: U. S. Department of Agriculture, 1969.

Migdalski, Edward C. **Boy's Book of Fishes.** New York: The Ronald Press Company, 1964.

Mississippi Wildlife Conservation Manual. Jackson: Mississippi Game and Fish Commission, (current edition).

Warm-Water Fishponds. Farmer's Bulletin No. 2250. Washington: U. S. Department of Agriculture, 1971.

Wildlife: An Important Agricultural Crop in Mississippi. Jackson: U. S. Department of Agriculture, Soil Conservation Service, 1969.

XI. Utilizing resources for recreation

A. Opportunities in recreational business

B. Kinds of recreational businesses

1. Vacation cottages, cabins, and residences
2. Fee fishing areas (lakes, streams, and ponds)
3. Hunting areas and preserves
4. Organized group camps
5. Horseback riding (stabling, boarding, breeding, etc.)
6. Golf courses
7. Campgrounds
8. Picnic and play areas
9. Vacation farms and ranches
10. Water sports areas
11. Sports areas, including rifle ranges, archery ranges, etc.

12. Hiking, nature study, cycle, and horse trails

C. Determining the feasibility of a recreational business
   1. Location of population and demand for recreational facilities
   2. Analysis of resources available for establishment and operation
      a. Initial capital outlay required
      b. Operating cost
      c. Available land resources
      d. Available water resources
      e. Accessibility and proximity to potential users
      f. Available labor

D. Planning and developing a recreational business
   1. Selecting land areas suitable for appropriate or desired recreational business
   2. Facilities and features, design and construction
   3. Ecological effects of a recreational business
   4. Waste disposal system
   5. Permits for operation
   6. Health and sanitation regulations
   7. Zoning laws and regulations

E. Office management for recreational businesses
   1. User fees and charges
   2. Bookkeeping and record keeping
   3. Federal, state, and local taxes
   4. Liabilities and insurance protection

F. Maintenance and operation of recreational business
   1. Quality of services and facilities provided
   2. Erosion control measures
   3. Aesthetic appearance, including landscaping
   4. Pollution abatement measures
   5. Promotional considerations
      a. Advertisements
      b. Brochures
      c. Signs

Student Activities

1. Arrange for students to visit a nearby recreational business. Evaluate the following:
   a. Main recreational attraction of the business
   b. Adequacy of facilities and features
   c. Volume of visitation or use in relation to facilities and main attraction
   d. Environmental impact — erosion, pollution, and solid wastes
   e. Promotional activities
   f. Permits and licenses required
   g. Liability and insurance protection
   h. Recommendations for improved development and use

2. Have students study the local community and design an appropriate recreational business. Select suitable land and water areas. Determine the facilities and demand for such a business. Also, estimate the cost for establishing and operating the business and the minimum returns from annual visitation or use necessary to meet annual costs.

3. Have students design a promotional brochure describing a local recreational business or a hypothetical recreational business.

Suggested References

Larsen, Dayton M., and Miles, William R. **Nature Trails.** Extension Bulletin 368. St. Paul: University of Minnesota, Cooperative Extension Service, (n.d.).

Rural Recreation. Miscellaneous Publication No. 930. Washington: U. S. Department of Agriculture, 1963.

Warm-Water Fishponds. Farmer's Bulletin No. 2250. Washington: U. S. Department of Agriculture, 1971.

XII. Conducting programs in resource planning

A. Definition of resource planning

B. Need and importance of resource planning

C. Objectives of resource planning

D. Responsibilities in resource planning

   1. General public

   2. Political leaders

   3. Individual land users

   4. Professional planners

E. Elements of a resource plan

F. Process of planning

   1. Analysis of resources

2. Objectives of man
3. Bringing resources and objectives together

G. Implementation of a resource plan

H. Updating resource plans

Student Activities

1. Arrange for an employee of the Soil Conservation Service who is involved in resource planning to visit class and discuss the importance of such plans. Also, have him relate how the plans are made and implemented.
2. Have students discuss how the use of land areas in the local community has changed. Also, have them attempt to determine the extent of long range planning before these uses were implemented.

Suggested References

Creative Conservation in Mississippi. Jackson: U. S. Department of Agriculture, Soil Conservation Service, 1970.

What Is a Farm Conservation Plan? PA-629. Washington: U. S. Department of Agriculture, Soil Conservation Service, 1965.

XIII. Utilizing mechanics in agricultural resources

(Areas of instruction in agricultural mechanics as related to agricultural resources may be selected from **A Guide for Teaching Agricultural Mechanics.**)

XIV. Securing employment in agricultural resources occupations

A. Job location

1. Employment agencies
2. Newspaper ads
3. Family and friends
4. Direct calling

B. Job application

1. Completion of a job application blank
2. Personal interviews
3. Letters of application
4. Personal data sheets

C. Problems confronting employees

D. Traits that workers should have

E. Relations with other employees

F. Changing jobs

G. Advancing in a job

Student Activities

1. Have students practice completing sample job application forms.
2. Have students role-play a job interview.

Suggested References

Kimbrell, Grady, and Vineyard, Ben S. **Succeeding in the World of Work.** Bloomington, Illinois: McKnight and McKnight Publishing Company, 1970.

Lee, Jasper S. **Occupational Orientation: An Introduction to the World of Work.** State College: Mississippi State University, Curriculum Coordinating Unit, 1971; pp. 175-195.

Suggested Ranges of Time for Instruction

Suggested ranges of time for organized instruction in agricultural resources are listed below. The amount of time a teacher devotes to instruction in the various areas of agricultural resources should be based on the needs of students. The suggested minimum number of hours (175) is designed for courses which meet one hour each day for the academic year. The suggested maximum number of hours (350) is designed for courses which meet two hours each day during the academic year or one hour each day for two years. The ranges of time given are flexible and have been estimated. It is possible that there may not be a need for instruction in all of the areas. In this case, instruction in these areas should not be included in the instructional program.

Units of Instruction	Hours
I. Determining the Occupational Opportunities in Agricultural Resources	4-5
II. Developing Leadership for Occupations in Agricultural Resources	4-8
III. Understanding the Occupational Experience Program in Agricultural Resources	4-6
IV. Understanding the Nature of Agricultural Resources	10-25
V. Conserving and Utilizing Soil	30-70
VI. Conserving and Utilizing Water	20-40
VII. Conserving and Utilizing Grasslands and Forests	15-30
VIII. Maintaining the Air	10-25
IX. Managing Wildlife	30-45
X. Managing Fish	15-30
XI. Utilizing Resources for Recreation	15-30
XII. Conducting Programs in Resource Planning	5-10
XIII. Utilizing Mechanics in Agricultural Resources	10-20
XIV. Securing Employment in Agricultural Resources Occupations	3-6
	175-350